

method,
wherein the child mask is used as the object mask.

REMARKS

By the above actions, claim 1 has been amended. Additionally, accompanying this Amendment under separate cover letter is a new sheet of drawings containing a revised Fig. 1. In view of these actions and the following remarks, reconsideration of this application is now requested.

With regard to the objection to the drawings, the new sheet of drawings containing a revised Fig. 1. referred to above adds the required "Prior Art" legend, so that withdrawal of this objection is in order and is requested.

With regard to the Examiner's objection to claim 1, the above revision to claim 1 is believed to rectify the problem noted by the Examiner by setting forth that the master mask is used as the object mask for making the child mask. Therefore, withdrawal of this objection is also in order and is now requested.

Turning now to the prior art rejections, claims 1, 5, 8, & 12 stand rejected under 35 U.S.C. § 102 as being anticipated by the disclosure of the Dick et al. patent. However, it can only be assumed that this rejection was formulated based on the alternative interpretations that the Examiner indicated (in his objection to claim 1) that claim 1 was subject to. On the other hand, with the amendment to claim 1 which eliminates the interpretation in which data generated using the master mask is used in the exposure method to fabricate the child mask, Dick et al. is no longer relevant since it relates to a data generating method and not to the use of a master mask as an object mask for production of a child mask by electron beam proximity exposure. Therefore, this rejection should now be withdrawn, and such action is requested.

Claims 1 & 9 have been rejected under 35 U.S.C. § 102 as being anticipated by the disclosure of the Livesay et al. patent. As with Dick et al., Livesay et al. relate to an electron beam pattern generator, not to electron beam lithography, and as such, the revision to claim 1 should make this patent as inapplicable as the Dick et al. patent so that withdrawal of this

rejection is also in order and is now requested.

Additionally, all of the claims have been rejected under 35 U.S.C. §§ 102/103 as being anticipated/rendered unpatentable by the disclosure of the patent to Randall, either by itself, or in combination with either the patent to Dick et al. or that to Owen et al. However, these rejections are considered to be inappropriate for the following reasons.

Firstly, Randall himself states, in the Background portion of his patent, that electron beam lithography is a different photolithography technique from ion beam lithography which suffers from different problems; see, column 1, lines 29-60. Furthermore, Randall then goes on in his Summary of the Invention to indicate that his invention is directed to mask for use “in connection with ion beam lithography;” col. 2, penultimate paragraph. While it is recognized that Randall states that “nothing prohibits the teaching herein from being applied to electron beam lithography” (col. 3, lines 62-64), his patent is entirely silent as to how that might be done given the acknowledged differences between electron beam lithography and ion beam lithography. Not only does Randall fail to teach how his concept might be applied to electron beam lithography, but his patent contains statements that those skilled in the art would find to clearly teach away from doing so because of the disclosed problems associated therewith.

That is, Randall expressly states that electron beam lithography is “too slow for practical use in volume production” (col. 1, lines 29-33). Furthermore, it is pointed out that Randall’s disclosure is directed specifically to “masks which are used in connection with parallel-printing of patterns” (col. 1, lines 8-10), and Randall specifically indicates that electron beam lithography “has critical dimension control problems due to a proximity effect inherent in the electron beam process,” and that, while the proximity effect can be corrected with local dose variation in the electron beam process, this “problem is difficult to control when parallel printing” (col. 1, lines 33-39). Thus, the quoted statement concerning use of Randall’s concept with electron beam lithography must be viewed as nothing more than a throw-in statement of the type often found in patents simply to provide a basis for attempting to obtain a broadened scope of protection, but which provides no real teaching to those of ordinary skill in the art and which those skilled in the art would be led away from attempting

by Randall's own disclosure of the problems of utilizing electron beam lithography for the parallel printing process to which his invention is directed.

Moreover, the present invention is directed the concept of having a single apparatus serve both as a pattern copying apparatus and also as a mask writing apparatus, and nowhere in the Randall patent is such a concept taught or suggested, Randall merely teaching the use of a first mask as a "master for all future masks." This latter point suggests that, again, this rejection may have been based at least in part on the no longer viable alternative interpretation of claim 1, noted above.

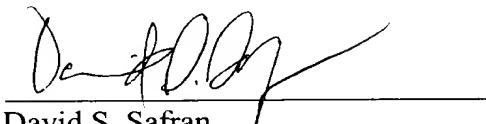
As for the Dick et al. patent, as should be apparent from the comments above, it is incapable of suggesting the present invention, even if combined with the teachings of Randall, since neither are directly relevant to the language of amended claim 1.¹ Likewise, the Owen et al. patent is merely directed to a technique for correction of the electron beam proximity effect (a problem noted by Randall as being associated with electron beam photolithography), but which has no relevance to the ion beam lithography, parallel printing technique of Randall, and which is not suggestive of the present applicant's invention.

Accordingly, it is submitted that the Randall patent, with or without, the added teachings of either Dick et al. or Owen et al. is incapable of suggesting the present invention. Thus, all of the rejections under §§ 102/103 based thereon should be withdrawn and such action is now requested.

While the present application is now believed to be in condition for allowance, should the Examiner find some issue to remain unresolved, or should any new issues arise, which could be eliminated through discussions with applicant's representative, then the Examiner is

invited to contact the undersigned by telephone in order that the further prosecution of this application can thereby be expedited.

Respectfully submitted,



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Mark-Up Showing Amendments Made

In the Claims:

Please amend the claims as follows:

1. A method for manufacturing an object mask which is used in an electron beam proximity exposure apparatus comprising an electron beam source which emits a collimated electron beam, the object mask having an aperture which is arranged on a path of the electron beam, and a stage which holds and moves an object, wherein the object mask is arranged in proximity to a surface of the object and a pattern corresponding to the aperture of the object mask is exposed on the surface of the object with the electron beam having passed through the aperture, the method comprising the steps of:

manufacturing a master mask having an aperture of a pattern identical with the object mask; and

manufacturing a child mask by exposing an aperture pattern identical with the master mask by using the master mask as the object mask in an electron beam proximity exposure method,

wherein the child mask is used as the object mask.